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NOTES AND COMMENTS.

A BELATED CRAB.

THE tendency of evolution in both nature and art is from the coarse to the fine, the unwieldy and ineffective to the light and effective, the simple and awkward to the elaborate and graceful. Clubs, stones, javelins, and catapults have evolved into breach-loading rifles and Gatling guns. The simple sun-dial was followed by the little more elaborate clepsydra, and the clumsy, coarsely-constructed clock has developed into the exquisitely-wrought Swiss watch.

The diminutive and delicate ferns of to-day had their prototypes, ages ago, in gigantic trees of the same general type, and the only remaining representatives of the enormous and hideous saurians of geologic times are tiny, graceful lizards and the various species of *crocodilia*. The *megatherium*, a cast of whose massive skeleton stands so conspicuously in many natural-history rooms, which stood on the ground and fed on the branches of trees, has dwindled to the little sloth; the *glyptodon*, whose turtle-like shell would furnish ample shelter to a half-dozen tramps, has shrunk to the insignificant little armadillo; and the *labyrinthodon*, whose enormous hand-shaped footprints have come down to us in the solid rock, is now represented only by the frog and the toad. Even the elephant, which seems to us so huge, is but a dwarf compared with his predecessor, the *mastodon*.

But the elephant, as well as the crocodile and the alligator, is probably destined to disappear very soon (geologically speaking), and give place to creatures more in harmony with other representatives of this, the *neozoic*, age. One who is at all familiar with the story of the ages can hardly view a file of elephants pursuing their clumsy march through our streets on "circus day" without fancying that he is looking upon a delegation from a bygone era, or that he is himself still living in the last years of that era. How long will it be before imaginative naturalists will wonder how it seemed for comparatively-civilized men to be contemporary with the last representatives of geologic monsters, and actually to see them in the flesh?

Perhaps the most belated of all—the greatest anachronism among all the creatures that survive to-day—is the *limulus*, or horseshoe crab. Big as he is, he is closely allied to the class *insecta*, or, according to Professor Alpheus Hyatt, more closely still to the *arachnida*, or spiders. In fact, he is, in many respects, less highly organized than either.

Now, our general idea of an insect is a little creature with antennæ; six jointed legs; fixed eyes, consisting of many distinct facets or lenses, somewhat like a multiplying glass; mouth parts working from side to side or modified to form a sucking-tube or a proboscis; a body in three principal sections, completely covered with a chitinous armor and with or without wings;

breathing by a system of *tracheæ*, or internal tubes; and passing in its life-history through three well-marked metamorphoses. A spider differs from a true insect mainly in having eight legs instead of six, several single eyes instead of two multiple eyes, and a somewhat different breathing apparatus, and in being distinctly divided into two instead of three sections. But one of the most distinguishing characteristics of both spiders and insects is their diminutive size. A microscope is indispensable to a thorough study of their structure.

The limulus is like either an insect or a spider in all the respects which have been named, except size and number of legs. In its metamorphoses it is more like the spiders, which are far less protean than the insects.

When in your next summer stroll upon the beach you find a horseshoe crab, try to realize that you are looking upon a creature bearing a relation to insects and spiders very much like that which the gigantic *ichthyosaurus* of untold ages ago bore to the lizards of to-day. See its chitinous armor, almost exactly like that which protects the beetle, even in its color; its jointed legs, with their pedal claws or pincers, almost exactly like the beetle's legs magnified. And its eyes—you have often wondered at the multiple eyes of insects as revealed by the microscope; but you will need no microscope to see the multiple eyes of the limulus. There they are, each as big as a bean, and each facet as big as a pinhead! There seems something uncanny in this creature, which has so much of the insect and of the spider about him, and yet dares to be as big as a sea-turtle fit for the table,—as if he had just crawled out from the field of the microscope, retaining in reality his apparent size! or as if Dean Swift's dream had come true, and a Brobdingnagian spider were actually crawling before your eyes!

He is not only too big for this advanced age of the small and the delicate, but, as I have implied, his huge structure is marked by the simplicity of nature's 'prentice handiwork. His very jaws are nothing more than the upper segments of his legs, as if nature forgot or could not afford to fashion organs for the special purpose of mastication, and so made shift to impress the locomotive organs into that extremely important service.

In order that the non-scientific reader may understand more thoroughly how nature began her work, and how she has improved upon it since, I will briefly describe her method of producing all living creatures, plants and animals, from the simplest to the most complex.

In the egg or seed, or what in the lowest forms corresponds to this, there is a little cell of living, jelly-like substance (*protoplasm*) called the germinating disk, or simply the germ. In the very lowest forms of life this never develops any further, but constitutes in itself the individual plant or animal. As it is nourished by the absorption and assimilation of food, it grows larger and divides or breaks in two, like a drop of water that has grown too large to hold together, and thus two individuals are formed. Each of these may form two others, and so the process may go on indefinitely. In the higher forms of life the dividing cells simply cling together, thus forming a more or less complex organism, as the different groups of cells are set apart, or "differentiated," as the process is called, for different purposes, such as eating, digesting, excreting, breathing, feeling, travelling, and finally tasting, hearing, smelling, seeing, uttering sounds, and *thinking*.

In the group of the *arthropoda*, or jointed-legged animals, to which the limulus belongs, the eggs of all the different kinds are for a good many of the first stages so nearly alike that one could not tell from their structure

alone whether they were destined to become butterflies or moths, bugs or beetles, spiders or scorpions, crabs or lobsters, the ancient and long-extinct trilobite or the modern limulus. The germinating disk in all grows and divides, grows and divides, until presently a body is formed with two rows of little knobs or buds extending from end to end. These knobs or buds are at first precisely alike, and are the beginnings, so to speak, of so many jointed legs. As growth goes on, some of these begin to differ from the rest, the anterior or foremost pair, for instance, gradually taking the form of jointed feelers, or antennæ. Another pair slowly changes to mandibles, or biting jaws, and still others change to other mouth parts, all jointed indeed, but bearing no other resemblance to legs. The most curious fact is that the same or corresponding knobs, identifying them by their original position in the egg, become in one animal antennæ, in another jaws, and in still another walking legs. For example, those which in the lobster become the second pair of antennæ become in the scorpion biting jaws. In fact, all the jointed, paired appendages of the scorpion, mouth parts, legs, and all, correspond to merely the mouth parts of the lobster.

If you examine the latter, you will see all the degrees of modification from organs which seem precisely like walking legs in all respects except that they never could be used for walking, to those which suggest legs in no respect except that they are jointed.

But in the limulus all the knobs except the first pair (which become antennæ, or "antennules") simply carry out the first crude intention, and become legs, all attached to the body in the same way and all bearing the clawed feet at the end, the antennules themselves sharing in the last-named mark of their common origin. Nature seems, as we have said, to have forgotten at first to provide a mouth with proper masticating apparatus, and so, as an afterthought, to have added teeth to the upper joints of the legs. The poor creature, therefore, has to bite off his food, so to speak, with his elbows and knees, and chew it with his upper arms and thighs!

That so huge, coarse, clumsily-contrived a creature should be found among nature's first essays at animal-building is no more strange, perhaps, than that hatchets of stone instead of steel should be found among the relics of prehistoric artisanship; but that it should still survive among the ants, bees, horses, and *men* of to-day is wonderful indeed! One might expect to find it in some out-of-the-way corner of the world, where development has been at a standstill for ages; in Australia, for instance, where many other ancient types, elsewhere extinct, still exist; but here it is in the centre of civilization, crawling before the very eyes of the sea-bather in the latest Parisian costume!

The half-rational fancy that it was overlooked and forgotten by nature when she swept away the *ptero-dactyl*, the *plesiosaur*, and the rest of her crude and coarse 'prentice work, seems borne out by the fact that almost its very counterpart *was* suppressed, like an author's juvenile poetry, long before the Triassic period. The trilobite, which peopled the marshes, river beds, and shores of the Cambrian and Silurian periods in vast multitudes, was almost as much like the limulus of to-day as the crab is like a lobster. The egg of one could hardly be distinguished from that of the other. The unhatched limulus is, to all intents and purposes, a young trilobite, a little shorter, with much smaller eyes, and with some slight variation in the form of its appendages, but differing in no essential particular.

A story is told of a Russian sentry who was found gravely and faithfully

guarding a pile of rotting old boards. Persistent inquiry developed the fact that, during a war many years before, a magazine had stood there, that when the other sentry-posts had been removed at the close of the war this one had been overlooked, and that ever since a sentry had stood there day and night. As soon as the necessary amount of red-tape could be unwound the sentinel was taken off. Perhaps, when nature discovers her oversight of so many ages ago, she may "take off" the belated sentinels that pace our beaches in such multitudes.

When this "clearing-up" time shall come, pray heaven she may remove some of the other Belated Crabs, not only from the physical world, but from society, government, and religion!

EDWARD P. JACKSON.

THE LEGAL PROFESSION DEFENDED.

"MAKE for me a perfect world and I'll supply the honest lawyer, but as it is now, query," is the burden of Mr. Greene's article, "Can Lawyers be Honest?" in the February NORTH AMERICAN REVIEW. This is a very pretty proposal; but so long as no one seems willing or able to come forward and provide the necessary perfection, it is a little difficult to see why the lawyer of the present day should be held responsible, as he seems to be by Mr. Greene, for all the moral lapses which are going on in the world of litigation. I have heard of a young lawyer who drew upon himself the laughter of his time by advertising that he proposed to practise law "upon Christian principles." He starved until he was rescued by a good-natured infidel. He, like Mr. Greene, ought to have begun by bringing the men and women who require the vigilant supervision of lawyers into living up to their "Christian principles," and not making the lawyer do all this for them.

The proposition which Mr. Greene advances has its serious side. He puts his claim to answer the question, "Can lawyers be honest?" upon the ground that the world is a very bad one, and that the lawyer contributes to this evil state of things by exercising evasions and tergiversations to protect his client, and justifies himself by claiming that success is necessary no matter at what cost of moral fibre. Mr. Greene takes care, when he raises the question of the integrity of the profession, to say that he speaks of reputable counsel associated with reputable clients. I venture the assertion that every reputable lawyer who has become informed of the daily current of affairs as they take place in his office in private, and are put forth to the world in courts, can fairly deny Mr. Greene's charges and cite his own experience as utterly opposed thereto.

No one denies that the natural inclination of the client is to justify himself, and sometimes largely at the expense of his adversary. He goes to counsel because he there expects experience and judgment in such affairs superior to his own. The skilful lawyer, seeing his client in the first agony of consultation, can measure him and his case, and in the confidence which exists between client and counsel the battle for the moral as well as the legal right is fought over and over again. No one outside knows it. No one appreciates how much moral courage and devotion to truth are displayed by counsel, sometimes at the cost of a fee, and sometimes at the cost of favor. This means at least two-thirds of every busy lawyer's life. But Mr. Greene objects because lawyers do not say, when urged to employ the statute of limitations, or the plea of minority, or technicalities in the defence of crim-